# The Center for Cross Training Translation Cancer Researchers in Nanotechnology

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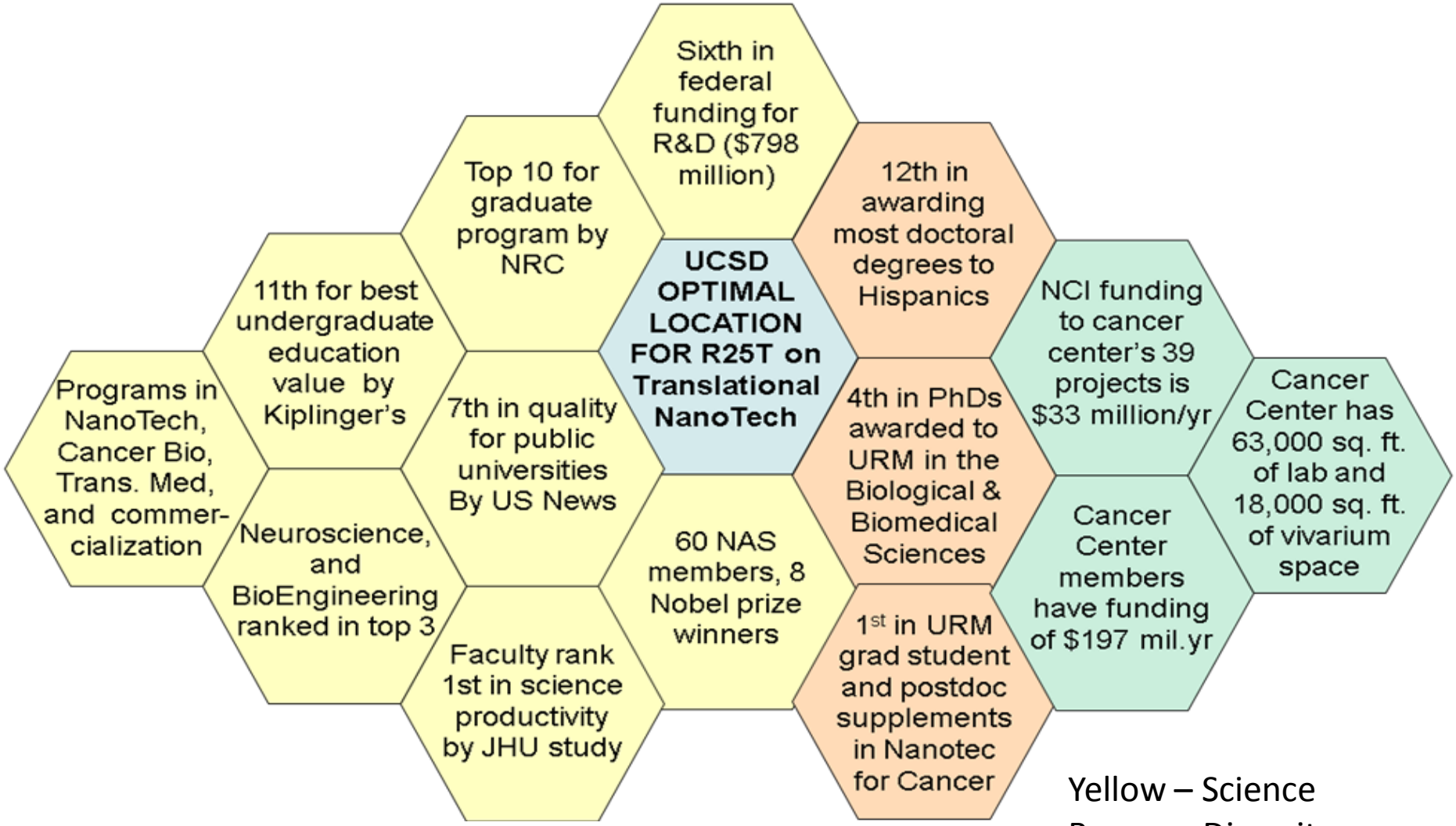
# Specific Aims

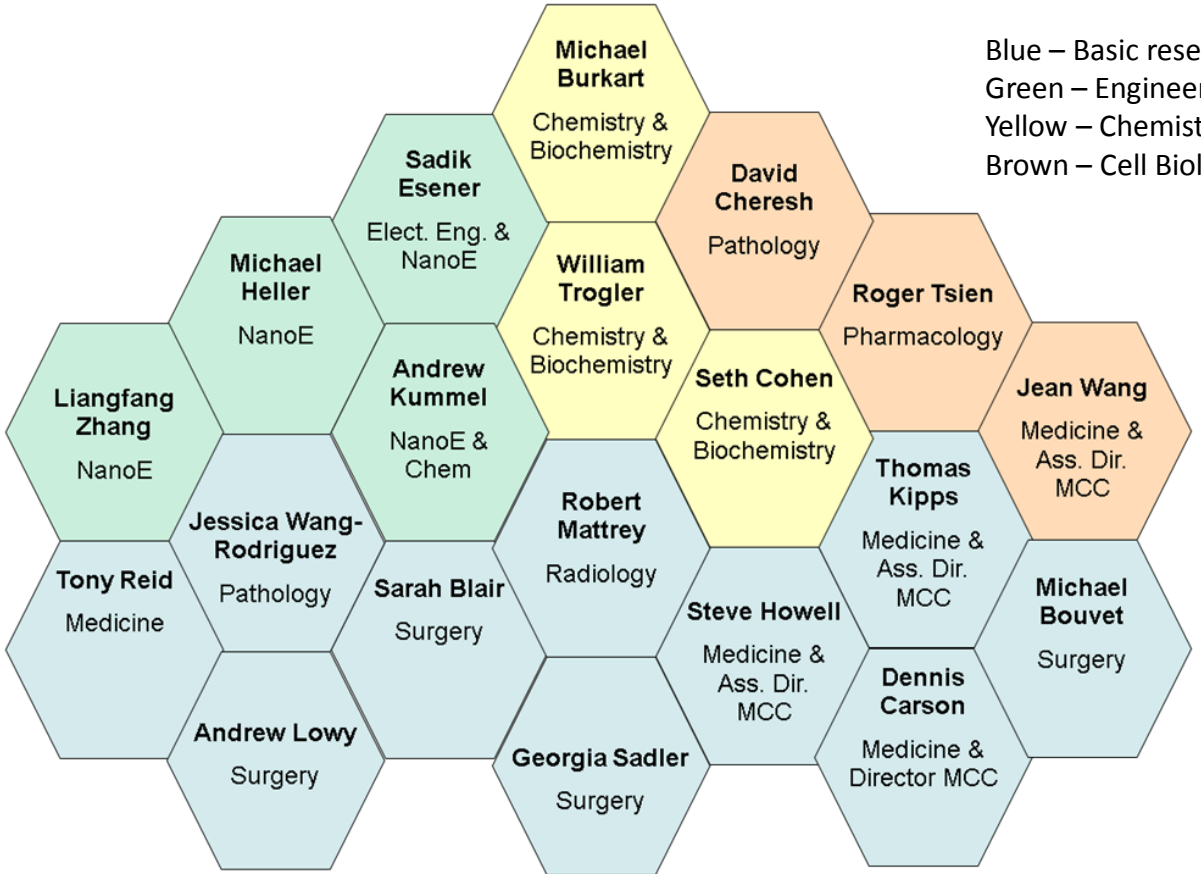
- **Specific Aim 1: Laboratory Training and Professional Development in Emerging Technology Oncology.** Each student will have two mentors, one a basic research scientist/engineer and one a clinical MD researcher.
- **Specific Aim 2: Didactic Cross-Training.** There will be two tracks for didactic training, one for biologists/biochemists and one for physical scientists/engineers to insure cross training. All trainees will have didactic training in nanomedicine technology commercialization.
- **Specific Aim 3: Outreach and Dissemination.** Information about cancer research and nanotechnology will be disseminated to a broad audience of students, researchers, and healthcare professionals. All outreach efforts will be tracked to evaluate effectiveness.
- **Specific Aim 4: Recruitment of Participants.** Each year two postdoctoral researchers/physicians and four to five predoctoral students will be recruited and supported in cancer research using emerging technologies. Each trainee will be supported by CRIN for two years and will participate in the CRIN program for four years.
- **Specific Aim 5: Diversity Recruitment and Retention:** We will enroll a sizable number of trainees from URMs as well as women in the physical sciences and engineering expanding our proven success in recruiting URMs to nanotechnology in cancer research.
- **Specific Aim 6 Program Evaluation**: We will assess the success of our program in producing translational nanotechnology scientists by tracking admitted trainees six years after they complete the program. Quarterly evaluations from mentors and trainees will be used to evaluate and improve upon the CRIN program.

# UCSD Research Reputation




Yellow – Science
Brown – Diversity
Green – Cancer Research

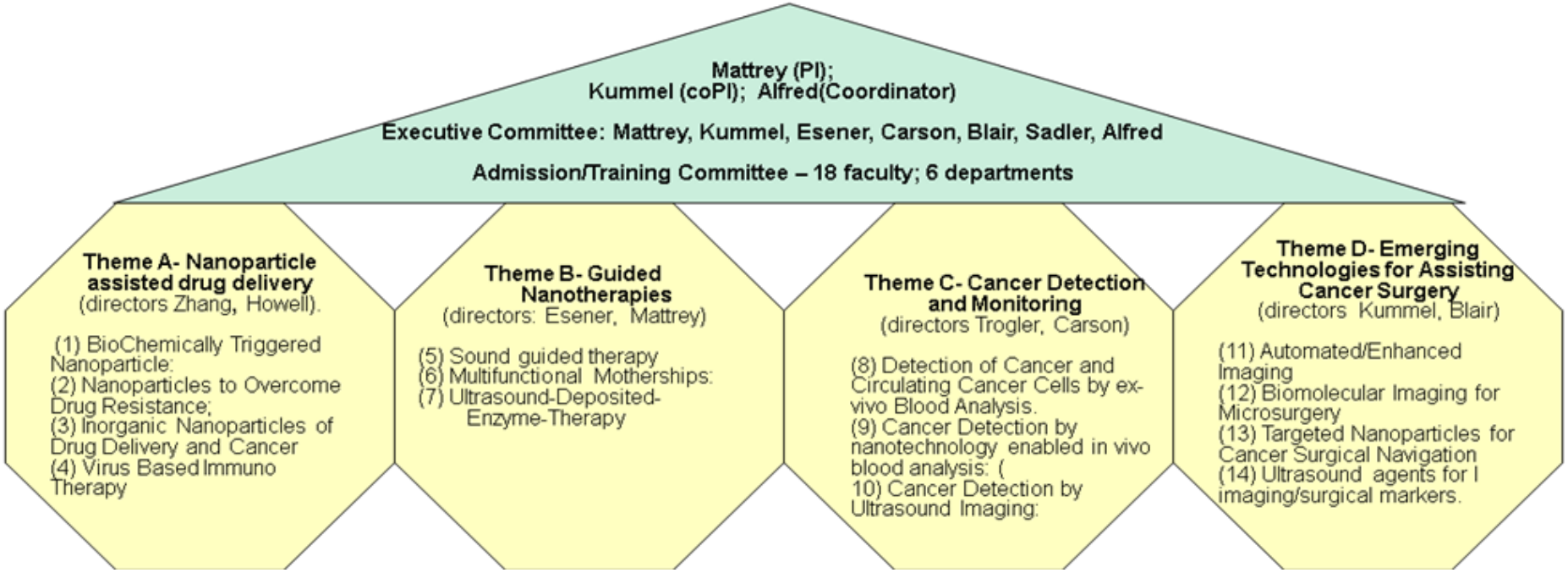
# Participating Faculty



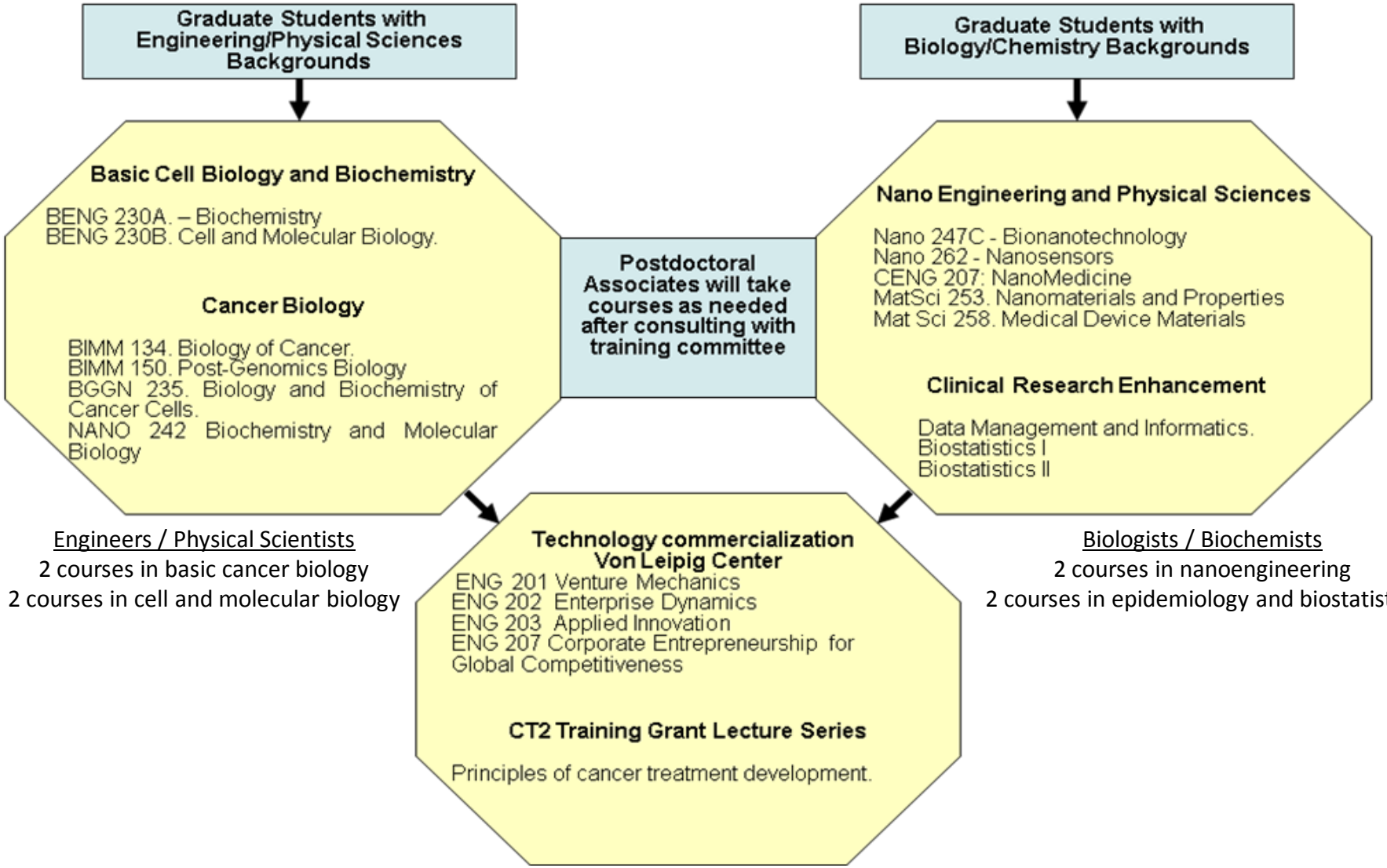

Blue – Basic research scientist
Green – Engineer
Yellow – Chemistry
Brown – Cell Biologist / Biochemist

- 20 core faculty members spanning Chemistry/Biochemistry, Bioengineering, Material Science, Nano Engineering, Biology, and Biomedical Sciences.
- Each faculty mentor is a participating member of the Cancer Center and has peer reviewed cancer or cancer-related research funding.
- All participating faculty are conducting translational research and have been selected because of their interest in emerging technologies in cancer diagnosis and/or therapy.

# Areas of Research Hybridizing Translation Cancer Research and Nanotechnology



# Outline of Courses




Engineers / Physical Scientists
2 courses in basic cancer biology
2 courses in cell and molecular biology

Biologists / Biochemists
2 courses in nanoengineering
2 courses in epidemiology and biostatistics

All
1 course in technology commercialization
lecture series in cancer treatment development

# Student and Program Evaluations

**Graduate Students Evaluation by Faculty**

Year 1 Year 2 Year 3 Year 4 Year 5

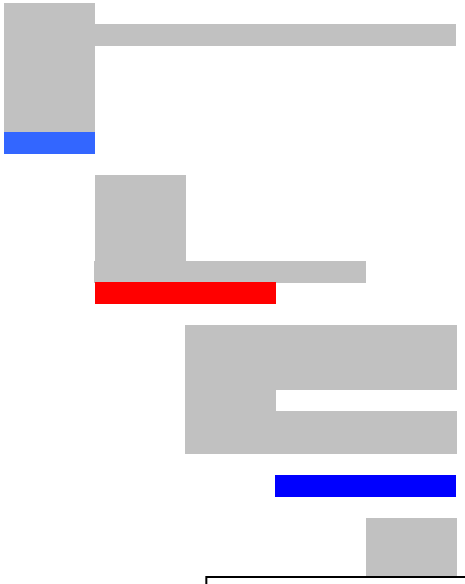
Develop training plan
Present at journal club 12 times
Present at group meeting 12 times
Complete lab rotations an choose research lab
Complete 80% of course work
Write F31 fellowship proposal
**Received support from home department**

Develop thesis outline
Present at group meeting twice per month
Present a poster at a local conference
Complete 100% of course work
Write F31 fellowship proposal
**Receive Support from R25T**

Co-author a paper
Present at group meeting every week
Present two posters at a local or national conferences
Prethesis Exam - final revision of thesis plan
Assist in writing a grant proposal
Write a paper as primary author

**Receive Support from fellowship or research grant**

Defend Thesis
Apply for postdoctoral fellowships
Apply for postdoctoral positions



**Postdoc Evaluation by Faculty**

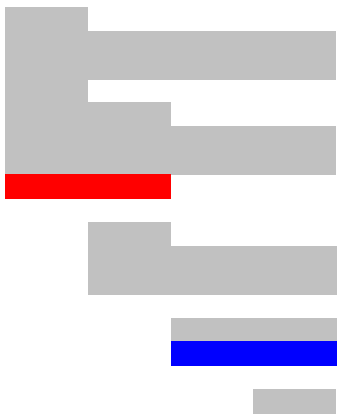
Year 1 Year 2 Year 3 Year 4

Develop training plan
Present at journal club 12 times
Present at group meeting each week
Complete 80% of course work
Present a poster at a local conference
write fellowship proposals
Co-author a paper
**Receive support from R25T**

Complete 100% of course work
Assist in writing a grant proposal
Write a paper as primary author

Present two posters at a local or national conferences
**Receive support from fellowship or research grant**

Write proposal and apply for faculty positions



**Evaluation of Trainee By Faculty**

**Program Evalation by Grad Students**

Year 1 Year 2 Year 3 Year 4 Year 5

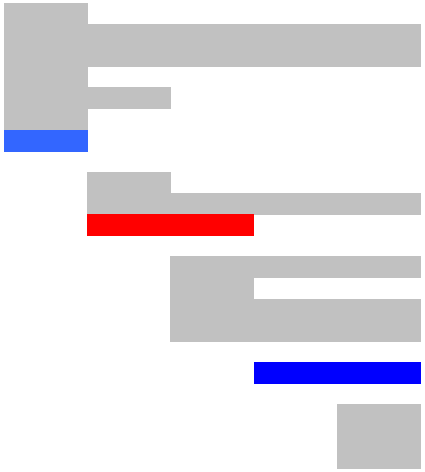
Develop training plan
Knowledge gained at journal club
Feedback at group meeting
Ability to work in top choice research lab
Quality of course work
Assistance with F31 proposal
**financial support from home department**

Assistance in developing thesis outline
Identifying relevant conference for poster presentations
**Financial Support from R25T**

Assistance in co-authoring a paper
Assistance in developing a thesis plan
Instruction in grant writing
Advising in writing 1st author paper

**Receive Support from fellowship or research grant**

Assistance is writing thesis
Assistance in writing postdoctoral fellowship proposals
Assistance in identifying postdoctoral fellowships positions



**Program Evaluation by Postdocs**

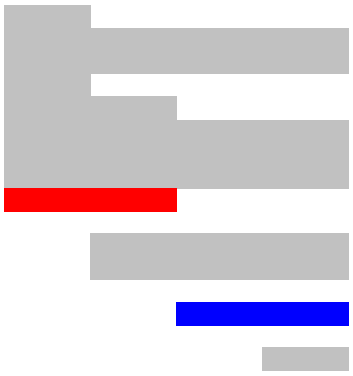
Year 1 Year 2 Year 3 Year 4

Develop training plan
Knowledge gained at journal club
Feedback at group meeting
Ability to work in top choice research lab
Quality of course work
Identifying relevant conference for poster presentations
Assistance fellowship proposals
Assistance in co-authoring a paper
**Financial support from R25T**

Assistance in writing a grant proposal
Askance in writing 1st author paper

**Financial support from fellowship or research grant**

Assistance in developing porposals for faculty positions

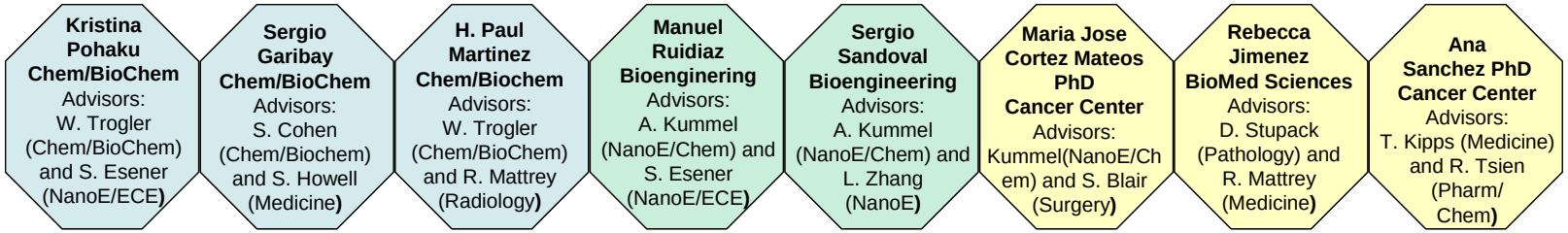


**Evaluation of the Program by the Trainees.**

# Recruitment of Under-Represented Minorities

| | 2005 | | | | 2006 | | | | 2007 | | | | 2008 | | | | 2009 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | applicants | admits | enrolls | total | applicants | admits | enrolls | total | applicants | admits | enrolls | total | applicants | admits | enrolls | total | applicants | admits | enrolls | total |
| Bioengineering | 465 | 140 | 46 | 138 | 529 | 145 | 52 | 156 | 468 | 134 | 41 | 156 | 453 | 128 | 46 | 159 | 383 | 117 | 47 | 168 |
| URM | 18 | 6 | 3 | 10 | 27 | 6 | 3 | 10 | 26 | 8 | 2 | 10 | 28 | 9 | 5 | 131 | 20 | 7 | 2 | 14 |
| Women | 165 | 52 | 15 | 51 | 192 | 57 | 19 | 59 | 163 | 54 | 22 | 68 | 152 | 48 | 14 | 65 | 140 | 40 | 12 | 60 |
| Biomedical Science | 361 | 65 | 24 | 116 | 308 | 68 | 27 | 130 | 310 | 75 | 38 | 129 | 338 | 76 | 44 | 137 | 348 | 72 | 31 | 138 |
| URM | 21 | 5 | 3 | 18 | 32 | 7 | 5 | 19 | 39 | 12 | 6 | 23 | 60 | 13 | 6 | 25 | 62 | 14 | 9 | 29 |
| Women | 221 | 136 | 12 | 77 | 192 | 39 | 11 | 64 | 181 | 48 | 20 | 80 | 198 | 44 | 17 | 89 | 214 | 48 | 17 | 90 |
| Chemistry/Biochemisty | 491 | 186 | 66 | 234 | 492 | 152 | 42 | 252 | 381 | 170 | 49 | 205 | 469 | 171 | 60 | 220 | 511 | 208 | 73 | 244 |
| URM | 34 | 13 | 6 | 28 | 44 | 18 | 5 | 28 | 26 | 14 | 4 | 26 | 41 | 12 | 4 | 25 | 37 | 11 | 3 | 22 |
| Women | 230 | 86 | 29 | 98 | 219 | 71 | 17 | 95 | 188 | 74 | 190 | 89 | 230 | 77 | 26 | 97 | 263 | 92 | 33 | 112 |
| Chemical Engineering | 56 | 12 | 2 | 13 | 28 | 1 | 0 | 8 | 35 | 8 | 2 | 9 | 49 | 8 | 2 | 6 | 76 | 18 | 9 | 11 |
| URM | 4 | 1 | 0 | 1 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 6 | 4 | 1 | 1 |
| Women | 24 | 7 | 2 | 7 | 16 | 1 | 0 | 4 | 9 | 1 | 0 | 3 | 17 | 4 | 0 | 1 | 27 | 5 | 3 | 2 |
| Electrical and Computer Engineering | 1472 | 235 | 96 | 386 | 1274 | 209 | 106 | 388 | 1501 | 273 | 118 | 393 | 1632 | 265 | 106 | 390 | 1713 | 404 | 206 | 471 |
| URM | 13 | 11 | 4 | 11 | 24 | 16 | 4 | 11 | 23 | 6 | 3 | 13 | 24 | 8 | 7 | 15 | 33 | 6 | 3 | 10 |
| Women | 263 | 30 | 13 | 63 | 220 | 32 | 20 | 60 | 274 | 59 | 0 | 65 | 304 | 38 | 11 | 59 | 271 | 67 | 31 | 72 |
| Material Science | 180 | 54 | 9 | 56 | 169 | 57 | 8 | 57 | 122 | 63 | 16 | 62 | 187 | 57 | 16 | 59 | 228 | 87 | 28 | 80 |
| URM | 3 | 2 | 2 | 2 | 3 | 1 | 1 | 2 | 2 | 1 | 0 | 2 | 8 | 5 | 3 | 6 | 7 | 5 | 3 | 7 |
| Women | 41 | 17 | 2 | 13 | 49 | 23 | 1 | 10 | 32 | 18 | 4 | 14 | 61 | 17 | 4 | 12 | 60 | 25 | 8 | 22 |

**Graduate Recruitment of Departments Most Active in the UCSD NanoTumor Center.**




**URM Students and Postdoc on ET CURE Supplements.**

- UCSD is the largest site for supplements for URM PhD students and postdocs in emerging technology in cancer research
- UCSD and the key faculty proposing CRIN have received 40% of all supplements awarded by the NCI NanoScience program for the support of URM graduate students and postdoctoral associates

# URM Recruitment and Retention

| Ethnicity | Percentage Retained in Program (n) | Percentage Still in University (n) | Percentage Graduated with BS Degree (n) | Of Those Who Graduated, Percentage Who Entered Graduate Programs (n) |
|---|---|---|---|---|
| African American n=10 | 80% (8) | 40% (4) | 40% (4) | 100% (4) |
| American Indian n=3 | 33% (1) | 33% (1) | 0 | 0 |
| SEC disadvantaged Asian n=19 | 100% (19) | 37% (7) | 63% (12) | 83% (10) |
| SEC disadvantaged Filipino n=3 | 100% (3) | 33% (1) | 67% (2) | 100% (2) |
| Hispanic n=28 | 100% (28) | 54% (15) | 46% (13) | 54% (7) |
| SED disadvantaged Middle Eastern n=3 | 100% (3) | 100% (3) | 0 | 0 |
| Pacific Islander n=5 | 80% (4) | 40% (2) | 40% (2) | 100% (2) |
| TOTAL N=71 | 93% (66) | 46% (33) | 46% (33) | 76% (25) |

**CURE Student Retention, Graduation Rates, and Graduate School Admission: 2002 - 2008**

**TARGETED/PLANNED ENROLLMENT FOR CRIN; TOTAL ENROLLMENT = 24**

This report format should NOT be used for data collection from study participants.

| Ethnic Category | Sex/Gender | | |
|---|---|---|---|
| | Females | Males | Total |
| Hispanic or Latino | 3 | 3 | 6 |
| Not Hispanic or Latino | 9 | 9 | 18 |
| **Ethnic Category: Total of All Subjects *** | 12 | 12 | 24 |
| **Racial Categories** | | | |
| Native American/Hawaiian/Alaskan, Other Pacific Islander, Filipino | | 1 | 1 |
| Black or African American | 1 | | 1 |
| White or Asian (includes Hispanic and Latino) | 11 | 11 | 22 |
| **Racial Categories: Total of All Subjects *** | 12 | 12 | 24 |

* The “Ethnic Category: Total of All Subjects” must be equal to the “Racial Categories: Total of All Subjects.”

**Targeted/Planned Enrolled Integrated Over 5 years.** The number of participants can increase by aggressively pursuing supplement funding for URM students and F31s for all students